$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$$ (3 columns, 2 rows)

A type 2×3 (2×3)

$2, 3$

$$-2A = -2\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} = \begin{pmatrix} -2 & -4 & -6 \\ -8 & -10 & -12 \end{pmatrix}$$

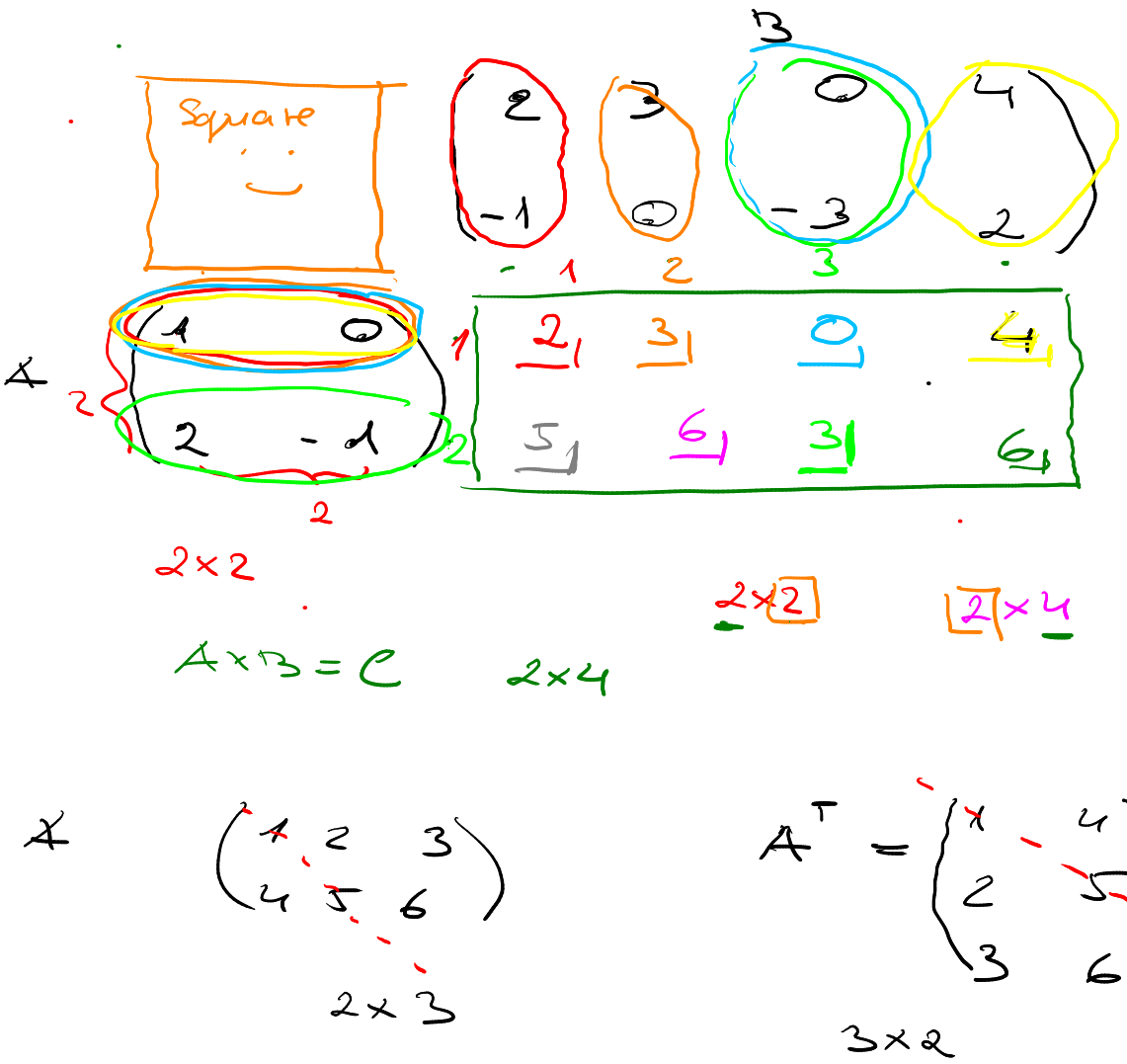
$$B = \begin{pmatrix} 1 & 0 & -1 \\ 2 & 2 & 6 \end{pmatrix}$$

2×3

same type

$$A + B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} + \begin{pmatrix} 1 & 0 & -1 \\ 2 & 2 & 6 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & 2 & 2 \\ 6 & 7 & 12 \end{pmatrix}$$



$$X \quad \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$$

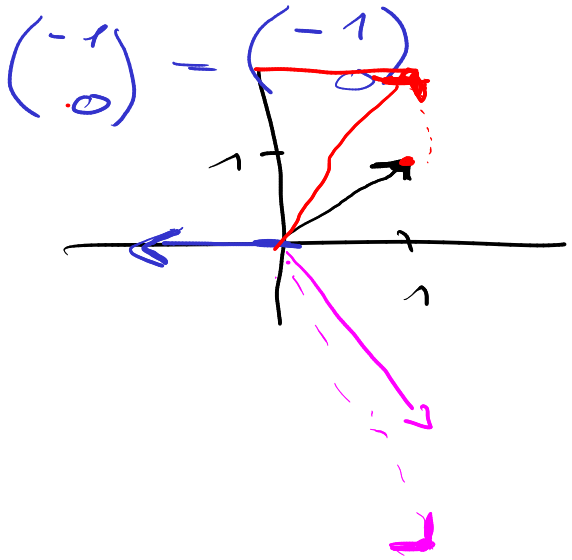
2×3

$$A^T = \begin{pmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{pmatrix}$$

3×2

$$\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$A \cdot \vec{v}$



$$\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x \\ 2y \end{pmatrix}$$